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ABSTRACT

An increasing amount of national attention is focused on connecting K-12 schools to the Internet, while at the same time, there is some debate on the benefits of using it in the classroom. Most teachers know the Internet is a source of information, but may not know how it works or how to use it. This ERIC Digest provides a framework to explain Internet concepts and terms. The digest describes the following four levels which make up the Internet model: (1) engineering level--the infrastructure that allows information to move from one computer to another; (2) application level--the software that allows users to gather and share information; (3) information service level--the combination of information with hardware and software that allows users to meet their information needs; and (4) use level--the level where users use the information they find on the Internet. New applications and new trends will make the Internet more real-time, more interactive, and more exciting. A constantly changing computer environment will present significant challenges to educators as they attempt to integrate revolutionary technology into an evolutionary teaching process. By understanding the basics of the Internet, educators will be better prepared to face the complexities that will surely follow. (Author/SWC)

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The Bread and Butter of the Internet
An ERIC Digest

by R. David Lankes
ERIC/IR

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ERIC DIGEST

January 1997 EDO-IR-97-02

The Bread and Butter of the Internet

by R. David Lankes

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Introduction

An increasing amount of national attention is focused on connecting K-12 schools to the Internet (Clinton, 1996), while at the same time, there is some debate on the benefits of using the Internet in the classroom. Most teachers know the Internet is a source of information, but they may not know how it works, or how to get it. The Internet is steeped in obscure acronyms and cute names. What other environment could brag about creating Veronica, to help Gopher users locate PDF files faster than FTP? By understanding the basics of how the Internet works, one can cut through the names, letters and numbers, and focus on using the Internet to improve teaching and learning.

The Internet Model

Many teachers find the Internet and its terminology very confusing. A framework, or model is needed to put these concepts and terms into context. The Internet can be broken into four basic levels (Lankes, 1994):

- **Engineering Level** - The infrastructure that allows information to move from one computer to another.
- **Application Level** - The software that allows users to gather and share information.
- **Information Service Level** - The combination of information with hardware and software that allows users to meet their information needs.
- **Use Level** - The level where users use the information they find on the Internet.

Educators can use this Internet model to help plan inservice agendas. For example, teacher training sessions can focus on the Information Service Level (finding lesson plans on the Internet) or on the Application Level ("Netscape Navigator: How to Use It"). Technology planning committees can use the model to help focus task forces—one to examine applications, another to determine appropriate use policies.

The Engineering Level

The engineering level is the technical part of the Internet. It is the infrastructure, composed of hardware and software, that allows information to flow from one point to another. The engineering level includes:

- **Computers** to create messages (information) to be sent over the network
- **Media** to transfer information over wires, fiber optics, infrared, etc); and,
- **Protocols** to format the messages and send them to appropriate computer addresses. The protocol (or language being spoken) on the Internet is called TCP/IP (Transmission Control Protocol/Internet Protocol).

The engineering level includes modems, routers and protocols. If the engineering layer is working properly, it is transparent to the user. Using the "Information Superhighway" metaphor, the engineering level is the "road" the information travels on.

Application Level

When teachers use the Internet to look for information, they are using the applications level. Applications level software such as Netscape *Navigator* or Microsoft's *Internet Explorer* don't contain any information in and of themselves, rather they are tools that allow teachers to link to Internet sites that contain the text, pictures, and other media that they can use in the classroom. Some basic Internet applications include:

- **Electronic mail** can be used to send memo-like messages to people connected to the Internet anywhere in the world. Mailing lists or Listservs can be used to send one e-mail message to hundreds of other users who share common interests.
- **Telnet** allows users to access and control programs on remote computers. With telnet, educators and students can use the most powerful computers in the world without leaving their classrooms.
- **FTP (File Transfer Protocol)** allows users to transfer files to and from a remote computer. A teacher can use FTP to get software and files from a vast collection of computer archives on the Internet. FTP can also be used to transfer World Wide Web files from a local computer to a remote server so that information can be shared with the world.
- **Gopher** allows users to navigate the Internet in a menu-like fashion. With Gopher, one can move through information systems easily by selecting numbers from a menu. Gophers com-

bine information from a number of sources, often worldwide, and present it all together on one menu. A user can traverse the world and never realize it.

- **The World Wide Web** allows users to navigate the Internet in a hypermedia format. With web browsers, a user can see information in a multimedia format. Text can be linked to pictures, pictures to animations, or animations to any digital information.

All Internet applications use the Client/Server model in one form or another. The user's computer is a client to a remote server. The client is responsible for formatting information, controlling user interaction, and managing all the resources on the user's computer. The server just holds information and sends it to the client when requested. The client/server paradigm gives the user control over the information being retrieved, and allows better use of the network and the user's computing resources.

In the "Information Superhighway" metaphor, the applications are the cars and trucks that travel the road.

Information Services Level

Teachers and students use the Internet to find information. In the Information Services Level, organizations (schools, publishers, businesses, etc.) use the Applications Level to provide information to end-users. Schools can become "Information Servers" by sharing their student works, and curriculum ideas with other educators on the Internet. One example of an information service on the net is AskERIC <http://www.askeric.org>.

Schools can use the same technology as Fortune 500 companies to build internal Internets, called intranets. Intranet technology is a hot topic in the corporate world, and schools can serve their communities by sharing what they know about this technology.

In the "Information Superhighway" metaphor, Information Services is the cargo in the cars and trucks that travel the road.

Use Level

How educators apply information found on the Internet to the classroom constitutes the Use Level of the Internet. Security of information, acceptable use, and intellectual property are all Use Level issues. What works in one community may not work in another. For example, should schools allow free and open access to the Internet for all students, or should they restrict what students can see on the Internet?

In the "Information Superhighway" metaphor, the Use Level deals with why the cars and trucks are on the road, and what happens to their cargo when they reach their destinations.

Conclusion

The Internet is dynamic. New applications and new trends will make the Internet more real-time, more interactive, and more exciting. A constantly changing computer environment will present significant challenges to educators as they attempt to integrate revolutionary technology into an evolutionary teaching process. Teachers will learn about new software, and administrators will debate the merits of applying new technologies to the educational mission of the school. By understanding the basics of the Internet, educators will be better prepared to face the complexities that will surely follow.

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